PSICOLOGIA ARGUMENTO

ISSN 0103-7013

doi: http://dx.doi.org/10.7213/psicolargum.40.110.AO07

Predicting internalizing and externalizing problems in pediatric cancer patients: Role of Anxiety and parental depression

Predizendo problemas internalizantes e externalizantes em pacientes pediátricos oncológicos: papel da ansiedade e depressão parental

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Abstract

This study aimed to investigate the roles of caregivers' anxiety, depression and SES in predicting internalizing and externalizing problems of children with cancer. The sample was comprised of 49 children and adolescents (20 girls; 29 boys) with cancer and their caregivers (39 female; 10 male). All 49 caregivers completed a questionnaire packet containing sociodemographic questions, questions about the child's illness, the Child Behavior Checklist (CBCL), the Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI). As expected, after having accounted for child and family sociodemographic variables, more depressed and anxious caregivers reported that their children had more of every aspect of narrow-band and broad-band problem considered. Conversely, there were no robust associations between family socioeconomic status (SES) and children's adjustment.

Keywords: *parental anxiety; parental depression; pediatric cancer; internalizing problems; externalizing problems.*

Resumo

Este estudo objetivou investigar os papéis da ansiedade, depressão e do nível socioeconômico dos cuidadores na predição de problemas de internalização e externalização de crianças com câncer. Participaram 49 crianças e adolescentes (20 meninas; 29 meninos) com câncer e seus cuidadores (39 mulheres; 10 homens). Todos os cuidadores preencheram questionários contendo perguntas sociodemográficas, sobre a doença da criança, o Child Behavior Checklist (CBCL), o Inventário de Depressão de Beck (BDI) e o Inventário de Ansiedade de Beck (BAI). Como esperado, depois de controladas as variáveis sociodemográficas, cuidadores mais deprimidos e ansiosos relataram mais problemas de banda estreita e larga dos filhos. Por outro lado, não houve associações robustas entre o status socioeconômico da família e o ajustamento psicológico das crianças.

Palavras-chave: *ansiedade dos pais; depressão dos pais; câncer pediátrico; problemas de internalização; problemas de externalização.*

Resumen

Este estudio tuvo como objetivo investigar los roles de la ansiedad, la depresión y el nivel socioeconómico de los cuidadores en la predicción de problemas de internalización y externalización en niños con cáncer. Participaron 49 niños y adolescentes (20 niñas; 29 niños) con cáncer y sus cuidadores (39 mujeres; 10 hombres). Todos los cuidadores completaron cuestionarios que contenían preguntas sociodemográficas sobre la enfermedad del niño, la Lista de verificación del comportamiento del niño (CBCL), el Inventario de depresión de Beck (BDI) y el Inventario de ansiedad de Beck (BAI). Como era de esperar, después de controlar las variables sociodemográficas, los cuidadores más deprimidos y ansiosos informaron más problemas con la banda estrecha y ancha de sus hijos. Por otro lado, no hubo asociaciones sólidas entre el nivel socioeconómico de la familia y el ajuste psicológico de los niños.

Palabras Claves: *ansiedad de los padres; depresión de los padres; cáncer pediátrico; problemas de internalización; problemas de subcontratación.*

Introduction

Although cancers rarely occur before age 20 year, they are considered the major cause of death in children worldwide and when occur during infancy, they bring a variety of medical, psychological, ethical, and societal concerns (Steliarova-Foucher et

al., 2017). Fortunately, considerable progress has been made in pediatric cancer treatment leading to increased survival (Howlader et al., 2016). Nonetheless, children with cancer often undergo multiple treatments, including invasive procedures, which normally cause several acute and long-term negative side effects. Painful procedures, repeated hospitalizations, and an uncertain prognosis are common stressors that can pose substantial distress to children (Marques, 2004) leading to impairment in level of cognitive, behavioral, and emotional functioning (Bitsko et al. 2016; Marcoux et al., 2016).

Studies of the emotional and behavioral functioning of children after cancer diagnosis indicate that they have increased risk of developing anxiety (Peng et al., 2021; Price et al., 2016), worry about death, confinement and feeling of alienation (Hedström, Haglund, Skolin, & von Essen, 2003), depression (Peng et al., 2021; Price et al., 2016), and somatization (Olagunju, Sarimiye, Olagunju, Habeebu, & Aina, 2016; Peng et al., 2021), as well as hyperactivity/impulsivity and oppositional defiant disorder (Liu et al., 2018). Many symptoms' profiles were also identified among adolescents who were survivors of child cancer, such as behavioral and emotional symptoms, including anxiety, post-traumatic stress symptoms, and cancer-related worry (McDonnell et al., 2017) and they are associated with type of treatment exposures and physical late effects (Brinkman et al., 2016). Moreover, chronic health conditions that result from childhood cancer therapies may contribute to emotional distress even in adult survivors of pediatric cancer (Vuotto et al., 2017). Thus, studies that focus on emotional problems related to pediatric cancer are relevant. Yet, few studies in Brazil have examined the factors that may contribute to internalizing and externalizing problems in child cancer survivors (Birck & Costa Junior, 2015). In this study, we examined two potentially important factors: Caregivers' emotional symptoms, and families' socioeconomic circumstances.

Caregivers' emotional symptoms

A diagnosis of pediatric cancer imposes high levels of distress for caregivers, and particularly mothers, which can be displayed in a variety of emotional symptoms (Lawrenz, Peker, & Castro, 2016). In addition to the diagnosis itself, caregivers' anxiety and depression also are related to changes in routine and family dynamics, negative impacts on marital relationship quality, restrictions on their social life, difficulties in

their working life, financial strain, and attending to the care of other offspring. In addition, they must live with the fear of suffering and potential death of their child. Elevated anxiety, depression, distress and fear in caregivers of children with pediatric cancer have been verified in studies worldwide (Olagunju et al., 2016; Katz et al. 2018; Kunin-Batson et al. 2016), including Brazil (Alves, Guirardello, & Kurashima, 2013; Brum & Aquino, 2014).

Despite this, posttraumatic growth is possible among mothers of children with cancer. In fact, mothers who reported greater total posttraumatic growth (which is a form of resilience) had children with decreased internalizing problems, externalizing problems, and behavior problems in general (Stephenson et al, 2017). Nonetheless, most parents feel distress rather than posttraumatic growth. Parents' symptoms of distress also may confer additional distress on children living with cancer. In accord with ecological systems theory (Broffenbrenner, 1979), the microsystem of the family environment functions as the context within which a child grows and develops. In the context of serious and chronic childhood diseases, the subsystem of the family, and more specifically, caregivers' reactions to the disease, can be seen as one relevant variable that influencing a child's adjustment (Firoozi & Abadi, 2020). Depression in caregivers has been found to be related to pediatric patients' internalizing and externalizing symptoms (Olagunju et al., 2016). Similarly, parental anxiety has been linked to general anxiety, perception of pain, and difficulty responding to distraction intervention in children with cancer and other serious illnesses (Link & Fortier, 2016). Focusing specifically on studies of pediatric cancer patients, parental depression has been found to predict distress intensity in very young children undergoing stem-cell transplantation (Jobe-Shields et al., 2009), and parental anxiety was found to predict children's distress during invasive chemotherapy (Dahlquist & Pendley, 2005).

Associations between parent and child distress and symptoms may reflect either the child's symptoms affecting the parent or vice versa. As has also been observed in studies of families with physically healthy children (Garber & Cole, 2010), recent longitudinal research on children with chronic diseases suggests that parents' emotional symptoms may have more influence on their children's adjustment than the converse. In studies of juvenile rheumatic diseases, parents' earlier distress predicted children's later distress, but children's earlier distress did not predict later parent distress (Fedele et al.,

2013; Ryan et al., 2010). Similarly, a longitudinal study of young children with cancer and their parents showed that earlier maternal psychopathology predicted children's subsequent internalizing and externalizing symptoms (Sawyer, Streiner, Antoniou, Toogood, & Rice, 1998).

Families' socioeconomic circumstances

A family's socioeconomic status (SES) may function as an important contextual influence on adjustment in children with cancer (Bemis et al., 2015). Physically healthy children raised in homes with lower SES have more internalizing and externalizing problems (Hastings et al., 2015). In a study of brain cancer pediatric patients, Carlson-Greene, Morris, and Krawiecki (1995) concluded that family SES was one of the strongest predictors of children's behavior problems. According to the Family Stress Model (Conger & Elder, 1994), lower SES increases parental stress and marital conflict, which undermines the quality of parenting behavior and the parent-child relationship, thereby adversely affecting children's adjustment. In a large study of pediatric cancer patients and their mothers, Bemis et al. (2015) found that lower family income was associated with more depression in mothers and children, and less educated mothers reported more depression, trauma and distress. In accord with the Family Stress Model, SES measures no longer significantly predicted parent or child depression after accounting for mothers' reports of feeling distressed. More studies are necessary to determine whether SES is an independent predictor of child adjustment, or whether it functions through other important variables such as emotional health of the caregiver.

Children's gender

Studies of gender differences have consistently found greater internalizing problems in girls than in boys, a difference that increases with age, whereas boys have more externalizing problems across all ages (Núñez-Peña, Suárez-Pellicionic, & Bono, 2016; Zahn-Waxler, Klimes-Dougan, & Slattery, 2000). For instance, Parco e Jó (2015) found that girls tend to show more somatic complaints and symptoms of anxiety and depression than boys. According to the authors, they also tend to be less rule breaking and show less attention problems than boys. In a similar way, Lacasa, Mitjavila, Ochoa, and Balluerka (2015) found that depression, somatic complaints and internalizing symptoms were predicted by female gender. On the other hand, delinquent behavior was predicted by male gender. This difference may be expected in pediatric cancer

populations, as girls and boys may differ in their emotional and behavioral expression of distress from diagnosis and treatment.

Objective

Thus, the aim of this study is to investigate the role of caregivers' anxiety, depression and SES in predicting internalizing and externalizing problems of children with cancer. Furthermore, we aimed to investigate whether the difference between genders found in studies on internalization and externalization problems will be observed in this sample formed by children and adolescents with cancer. We expected to find that caregivers with lower SES and more anxiety and depression symptoms would report that their children have more social withdrawal, anxiety/depression, and somatic complaints (internalizing problems), and more aggressive behavior (externalizing problems). In addition, caregivers were expected to report more internalizing problems in girls and more externalizing problems in boys.

Method

Participants

The sample was comprised of 49 children and adolescents (20 girls and 29 boys) in treatment for different types of cancer, and their caregivers (39 female and 10 male), who were enrolled in a Child Support Cancer Group of a medium size city of Bahia, a northern state of Brazil. Children and adolescents averaged 10.95 years old (SD = 3.78). An inclusion criterion was that the child was between 7 and 17 years old, and an exclusion criterion was the child having comorbid diagnoses including other chronic physical diseases, developmental disability, or mental deficiency. The choice for the amplitude of the sample, in terms of age, was due to the fact that the instrument used is appropriate for children between 6 and 18 years old.

Instruments

All 49 caregivers completed a questionnaire packet containing sociodemographic questions, questions about the child's illness (type of cancer and time of diagnosis), the types of treatment already received and currently being administered, and the child's emotional and behavioral problems, as well as their own symptoms of anxiety and depression. Demographics. For each family, monthly income was coded on a 7-point scale by increments of Brazilian minimum wage, from 1 = one month

Brazilian minimum wage or less, to 7 = more than eight times the Brazilian minimum wage (more than R$8.484,00 or US$1.683,03). Mothers' and fathers' levels of education also were scored on a 5-point scale, ranging from 1 (did not finish elementary school) to 5 (attended college or university); no parents had advanced graduate degrees.

Child Behavior Checklist (CBCL). The CBCL (Achenbach & Rescorla, 2001; Achenbach, Ivanova, Rescorla, Turner, & Althoff, 2016) is an age-normed measure of children's emotional and behavioral problems, appropriate for ages 6 to 18 years, which has been validated with a Brazilian sample (Emerich, Rocha, & Silvares, 2011). It included 113 items assessing problems grouped into eight subscales. In this study, the social withdrawal (α = .82), somatic complaints (α = .81) and anxiety /depression subscales (α = .81) for internalizing problems, and the aggressive behavior (α = .84) subscale for externalizing problems were examined. Each item was rated on a 3-point Likert scale (not true, somewhat or sometimes true, and very true or often true). The total score of each scale was calculated by dividing the sum of the item scores by the number of the items of the subscale.

Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI). Caregivers also completed the BDI (Beck & Steer, 1993) and BAI (Beck, Epstein, Brown, & Steer, 1988) to assess their depression and anxiety symptoms, respectively, both of which have been validated with a Brazilian sample (Cunha, 2001). Both BDI and BAI are composed of 21 questions, which must be answered according to a Likert scale of 4 points (ranging from 0 to 3).Total scores for BAI (α = .88) and BDI (α = .89) reflected the sums of the 21 items.

Procedure

The researchers individually approached the caregivers accompanying cancer patients at meetings of the Support Group at times previously agreed upon with the institution and explained the research aims. All of those who agreed to participate in the study were invited to read and, if they wished, to sign the Informed Consent Term (ICT). The researchers read the items from each instrument to the caregiver, and filled in their responses. The instruments were completed in approximately 35 minutes.

Data analysis

Skewness and kurtosis were examined for the distributions of all scale scores, and the Kolmogorov-Smirnov test was used to test the normality of the scores. All

variables were found to be normally distributed in this study. Next, the zero-order Pearson correlations between the variables were examined. Also, a principal components analysis was used to compute a measure of family SES from caregiver income and education measures. Finally, multiple linear regression analyses were used to predict children's internalizing and externalizing problems from family SES and caregivers' anxiety and depression scores, controlling for children's age and gender, and for caregivers' gender. All analyzes were performed on IBM SPSS 20.

Ethical Considerations

The research is part of a larger project that was submitted to the Ethics Committee of the Universidade Estadual de Santa Cruz, Bahia, Brazil, obtaining approval under the protocol number 1.538.313, on May 10th 2016.

Results

Descriptive analysis of the sociodemographic variables

The main results of the sociodemographic variables are shown in the Table 1,

Table 1

Frequency and percentage of the main sociodemographic variables of the study (n= 49)

Variable		Frequency	%
Child adolescent gender	Female	20	40.8
	Male	29	59.2
Race of the child	White	9	18.4
	Brown ("pardo")	31	63.3
	Black	8	16.3
	Native Indian	1	2.0
Level of Education of the child/adolescent	Early Childhood Education	8	16.3
	Elementary School (1st to 5 th grade)	21	42.9
	Middle School (6 th to 9th grade)	14	28.6
	High School (10th to 12th grade	6	12.2
Caregiver gender	Female	39	79.6

Variable		Frequency	%
Child adolescent gender	Female	20	40.8
	Male	29	59.2
	Male	10	20.4
Civil status of the caregiver	Single	17	34.7
	Married	24	49.0
	Widower	4	8.2
	Missing data	4	8.2
Level of education of the mother	Illiterate	2	4.1
	Elementary (1st to 5th grade) or Middle School (6 th to 9th grade)	26	53.1
	High School (10th to 12th grade	15	30.6
	Higher Education	4	8.2
	Post-Graduation	1	2.0
	Missing data	1	2.0
Level of Education of the father	Illiterate	6	12.2
	Elementary (1st to 5th grade) or Middle School (6 th to 9th grade)	21	42.9
	High School (10th to 12th grade	13	26.5
	Higher Education	5	10.2
	Post-Graduation	1	2.0
	Missing data	3	6.1
Mother occupation	Formal employment	11	22.4
	Unemployed	34	69.4
	Student	3	6.1
	Missing data	1	2.0
Father occupation	Formal employment	26	53.1
	Retired	2	4.1
	Unemployed	18	36.7
	Missing data	3	6.1

Variable		Frequency	%
Child adolescent gender	Female	20	40.8
	Male	29	59.2
Monthly family Income	Less than a Brazilian minimum wage	27	55.1
	More than1 and less or equal to 2 Brazilian minimum wages	12	24.5
	More than 2 and less or equal to 3 Brazilian minimum wages	4	8.2
	More than 3 and less or equal to 4 Brazilian minimum wages	0	0
	More than 4 and less or equal to 5 Brazilian minimum wages	1	2.0
	More than 8 Brazilian minimum wages	1	2.0
	Missing data	4	8.2

Children and adolescents averaged 10.95 years old (SD = 3.78). 16.3% of the children were in Early Childhood Education, 71.5% in Elementary and Middle School, and 12.2% in High School. Caregivers had mainly Elementary or Middle School level of education (26 mothers and 21 fathers). 34 mothers and 18 fathers were unemployed, 3 parents were students, 2 parents were retired, and the rest had part-time or full-time occupation at the time of the interview. The majority of participants (55%) reported a monthly family income of Brazilian minimum wage (R$1.212,00 or US$240,45) or less.

Regarding cancer type and treatment, most children and adolescent were diagnosed with Leukemia (40.8%), although 32.7% of the respondents did not know the type of cancer their children had. 55.6% of the children and adolescents had been diagnosed with cancer in the last three years. Regarding treatment, 65% of the children had undergone chemotherapy previously and 6.1% had some surgical procedure at some point of the treatment, whilst 63.3% were being currently being treated with chemotherapy and 2% with radiotherapy.

Descriptives analysis of the main variables

Descriptive statistics for children's and caregivers' problems and symptoms are in Table 2. Children and adolescents with cancer had significantly more internalizing than externalizing problems, paired $t(48) = 6.02$, $p < .001$. Caregivers reported significantly more anxiety and depression problems in girls ($M = 0.63$, $SD = 40$) than in

boys (M = 0.44, SD = .24), t(47) = 2.11, p < .05, but girls and boys did not differ on any other narrow-band or broad-band scores, all t(47) < 1.85.Age-standardized CBCL T-scores (M = 50, SD = 10) were examined to characterize the severity of problem scores, with T-scores ≥ 64 indicating clinically significant problems, and 60 < T < 63 indicating "borderline" clinical problems. There were two children (two girls) with clinical and four children (one girl and three boys) with borderline levels of internalizing problems, and four children (one girl and three boys) with clinical and one child (girl) with borderline levels of externalizing problems.

Considering caregivers' symptoms, caregivers reported significantly more anxiety than depression, paired t(48) = 2.45, p < .05. Based on BDI norms, five were borderline depressed (score = 17-20), five were moderated depressed (score = 21-30), and two were severely depressed (score = 31-40). Based on BAI norms, seven caregivers had moderate anxiety (score = 22-35) and two were severely anxious (score > 36).

Table 2

Mean, Standard Deviation, Minimum and Maximum Values of the Child Behavior Checklist Boad-band Scales and Narrow-band Subcales and Beck Anxiety Inventory and Back Depression Inventory Scales

CBCL Scales	Mean	SD	Minimum	Maximum
Anxiety/Depression	.51	.33	.00	1.81
Social Withdrawal	.94	.51	.00	2.00
Somatic Complaints	.52	.39	.00	1.73
Aggressive Behavior	.49	.35	.00	1.35
Internalizing Problems	.66	.41	.00	1.95
Externalizing Problems	.32	.27	.00	1.03
BAI and BDI Scales	Mean	SD	Minimum	Maximum
BAI	13.47	10.83	.00	41.00
BDI	10.61	10.00	.00	35.00
Combined score for Caregiver symptoms	24.08	19.18	.00	74.00

Note. For CBCL Subscales the maximum possible score is 2.0. For BAI Scoring: 0 - 9 = normal or no anxiety; 10 - 18= mild to moderate anxiety; 19 – 29 = moderate to severe anxiety; and 30 – 63 = severe

anxiety. For BDI Scoring: 1-10 = These ups and downs are considered normal; 11-16 = Mild mood disturbance; 17-20 = Borderline clinical depression; 21-30 = Moderate depression; 31-40 = Severe depression; over 40 = Extreme depression.

The correlations between the CBCL scores, children's age, and caregivers' depression, anxiety and SES measures are in Table 3. Children's CBCL scores were not significantly correlated with the three measures of SES, or with children's age. Caregivers' anxiety was significantly positively correlated with all CBCL narrow-band and broad-band scores, whilst caregivers' depression was significantly positively correlated with the four scores for internalizing problems only. Fisher's r-to-z conversion showed that there were no significant differences between caregivers' anxiety and depression in the magnitudes of correlations with CBCL scores, however. In addition, caregivers' anxiety and depression symptom scores were found to be very strongly positively correlated, $r = .70$, $p < .001$. Therefore, to avoid multicollinearity of predictors in the subsequent regression models, caregivers' anxiety and depression symptoms were summed ($M = 24.08$, $SD = 19.18$, range 0-74). Finally, the nine correlations between caregivers' separate and combined anxiety and depression symptoms and the three measures of family SES were examined. Only one correlation was significant; caregivers reported fewer combined anxiety-depression symptoms in families in which fathers had completed more education, $r = -.29$, $p < .05$.

Table 3

Pearson´s Correlations between CBCL dimensions, BDI and BAI scales and sociodemographic variables

	Caregiver Depression	Caregiver Anxiety	Child/adolescent´s Age	Educational Level - Mother	Education Level - Father	Monthly Income
Anxiety/ Depression	.38**	.42**	.17	.27§	.06	.18
Social Withdrawal	.46**	.44**	.21	.14	.02	.09
Somatic Complaints	.42**	.40**	.07	.19	-.17	-0.4
Aggressive Behavior	.177	.30*	-.16	.01	.18	-.05
Internalizin	.49**	.49**	.18	.24	-.03	.10

g Scale						
Externalizing Scale	.19	31*	-.14	-.01	.16	-.07

*Correlation is significant at the .05 level (2-tailed)

** Correlation is significant at the .01 level (2-tailed) § Correlation tendency (r = .06)

Principal components analysis

A principal components analysis including mother education, father education and family income supported a single-factor solution, eigenvalue = 1.97, accounting for 65.69% of the variance. Item loadings were all high, ranging from .740 to .925. The standardized factor solution score was saved and used in subsequent regression analyses.

Regression analysis

The multiple linear regression models predicting children's narrow-band and broadband CBCL internalizing problem scores from caregivers' anxiety and depression symptoms, and family SES, are in Table 4. All models were significant. Only child gender and caregiver anxiety-depression scores predicted the internalizing scores. Girls had more somatic complaints than boys, and tended to have higher scores for anxiety/depression and internalizing problems. In all models, caregivers with higher anxiety-depression scores reported more narrow-band and broad-band internalizing problems, all $p < .001$. There was no evidence that SES predicted CBCL internalizing scores in children and adolescents with cancer, either directly or indirectly through caregivers' symptoms.

Table 4

Hierarchical Regression Models (Stepwise Method) for Broad-Band and Narrow-Band Internalizing Behavior Problems

	Model	Anxiety/Depression (Narrow-Band)			Withdrawal (Narrow-Band)		
Step	Predictors	β	t	p	β	t	p
1 Control Variables (child)	Child Gender	-.25	-1.85	.071	-.04	.30	.767
	Child Age	-.05	-.34	.739	.04	.26	.799

2 Control Variables (caregivers)	Caregiver Gender	.05	.42	.676	.11	.79	.432
	SES Aggregated Score	.19	1.38	.175	.12	.88	.384
3 Caregiver emotional Variables	Caregivers BAI-BDI	.47	3.55	.001	.51	3.70	.001
Model statistics							
F (5,43)		3.92**			3.32*		
Adj. R 2		.233			.195		

		Somatic Complaints (Narrow-Band)			Internalizing Problems (Broad-Band)		
Step	Predictors	β	t	p	β	t	p
1 Control Variables (child)	Child Gender	-.30	-2.19	.034	-.24	-1.83	.074
	Child Age	-.13	-.92	.363	-.06	-.42	.675
2 Control Variables (caregivers)	Caregiver Gender	.04	.34	.737	.08	.63	.533
	SES Aggregated Score	-.03	-.24	.812	.11	.87	.390
3 Caregiver emotional Variables	Caregivers BAI-BDI	.48	3.55	.001	.57	4.44	.000
Model statistics							
F(5,43)		3.44**			5.04**		
Adj. R 2		.203			.296		

Note. F e R^2 values(Step 3) for final regression model ** p ≤.01 13 * p ≤ .05

The multiple linear regression models predicting children's aggressive behavior and externalizing problem scores are in Table 5. Both models were borderline significant, $p < .10$. Aggressive behavior problem scores and externalizing problem scores were significantly higher for younger children, and for children with more anxious-depressed caregivers. Boys had more externalizing problems and tended to have more aggressive behavior problems.

Table 5

Hierarchical Regression Models (Stepwise Method) for Broad-Band and Narrow-Band Externalizing Behavior Problems

	Model	Aggression (Narrow-Band)			Externalizing (Broad-Band)		
Step	Predictors	β	t	p	β	t	p
1 Control Variables (child)	Child Gender	-.28	-1.94 .	.058	-.27	-1.84	.073
	Child Age	-.33	-2.23 .	.031	-.30	-1.98	.054
2 Control Variables (caregivers)	Caregiver Gender	.02	.13	.899	.00	.00	.996
	SES Aggregated Score	.05	.37	.071	.02	.16	.875
3 Caregiver emotional Variables	Caregivers BAI-BDI	.35	2.48	.017	.353	2.44	.019
Model statistics							
F (5,43)		2.27+			2.05+		

Note. F e R^2 values (Step 3) for final regression model

+ $p \leq .10$

Discussion

The goal of this study was to examine whether caregivers with more symptoms of depression and anxiety, and who lived in homes with fewer socioeconomic resources, would report the presence of more internalizing and externalizing problems in their children with pediatric cancer. As expected, after having accounted for child and family sociodemographic variables, more depressed and anxious caregivers reported that their children had more of every aspect of narrow-band and broad-band problem considered. Conversely, there were no robust associations between family socioeconomic status (SES) and children's adjustment. Finally, as expected, girls had more problems than boys on the internalizing spectrum, whereas boys had more externalizing problems than girls, such that we observed the same gender differences in children with cancer that has been commonly observed in studies of physically healthy children (Zahn-Waxler et al., 2000).

Although most caregivers reported non-clinical levels of problems on the Child Behavior Checklist (CBCL), the children with pediatric cancer were more likely to have behavioral problems at borderline and clinical levels than is observed in typically developing populations. Their scores for internalizing problems were particularly elevated, which corroborates other studies of children with chronic diseases (Pinquart & Shen, 2011; SintNicolaas et al., 2016). In a longitudinal study that analyzed trajectories of internalizing and externalizing problems in 108 children with leukemia, SintNicolaas et al. (2016) found that internalizing problems tend to be more prevalent, intense and persistent than externalizing problems. Similarly, Hedström et al. (2003) found that the most frequently mentioned aspects of distress referred to the emotional dimension by children, parents and nurses were categorized as confinement, feeling of alienation, besides worry before medical procedures, which are emotions linked to social withdrawal. If we considered the narrowband syndrome symptoms, our results are consistent with several other studies that have suggested pediatric cancer patients are at risk of developing anxiety (Peng et al., 2021), depression (Peng et al., 2021), and somatization (Peng et al., 2021). Nevertheless, to a lesser extent externalizing problems also were present, corroborating the findings of other studies of children and adolescents with cancer (Hostert, Motta, & Enumo, 2015; Liu et al., 2018). 15

As expected, the caregivers of children living with cancer also reported experiencing distress, with elevated numbers of caregivers falling within the categories of borderline, moderately and severely depressed and/or anxious. Again, these findings are consistent with the results of several studies worldwide (Olagunju et al., 2016; Katz et al. 2018; KuninBatson et al. 2016), including Brazil (Alves et al., 2013; Brum & Aquino, 2014).

The correlation and regression analyses provided strong support for the hypothesis that more anxious and depressed caregivers would report that their children have more problems on both the narrow-band (depressive/anxious behavior, social withdrawal, somatic complaints, aggressive behavior) and broadband (internalizing and externalizing problems) dimensions of behavior problems. These findings are consistent with existing research suggesting that caregivers´ emotional distress may put children at risk for developing multiple types of psychological problems (Cummings & Davies, 1994; Lieb, Isensee, Höfler, Pfister, &Wittchen, 2002), including children with cancer

(Dahlquist & Pendley, 2005; Link & Fortier, 2016; Okado, Long, & Phipps, 2014; Olagunju et al., 2016). Downey and Coyne (1990), in an integrative review of studies using rigorous clinical assessment procedures and extensive control measures, concluded that children of depressed parents generally show higher levels of both externalizing and internalizing than children of emotionally-well parents, with internalizing problems being more common than externalizing problems (Downey & Coyne, 1990; Lee & Gotlib, 1989).

Several of the mechanisms that have been proposed to explain the link between caregiver distress and children's behavior problems, particularly on the internalizing spectrum, may be applicable for pediatric cancer patients (Okadoet al., 2014). There may be genetic influences, for instance, in which parents' biological susceptibility to certain mental health disorders may be passed to children, including depression (Beardslee, Gladstone, & O'Connor, 2011) and anxiety (Hettema, Neale, & Kendler, 2001). Alternately, caregivers' dysfunctional adjustment may influence the way they engage in child-rearing and providing emotional support to their offspring with cancer. For instance, caregiver anxiety may increase parental overcontrol and oversolicitousness (McLeod, Wood, & Weisz, 2007; Palermo & Eccleston, 2009; Root, Hastings, & Rubin, 2016) which in turn may potentiate child anxiety (Murray, Creswell, & Cooper, 2009; Hastings, Rubin, Smith, & Wagner, 2019). Also, depressive parents may exhibit a range of less optimal parenting behaviors, including inconsistent supportiveness or low sensitivity (Cummings & Davies, 1994), higher hostility and coerciveness in their parental practices, more emotional withdrawal (Lovejoy, Graczyk, O'Hare, & Neuman, 2000), and decreased scaffolding (Hoffman, Crnic, & Baker, 2006). All 16 of these would be likely to contribute to elevated problems in children, and particularly to elevated internalizing problems in children who are dealing with the dear, uncertainty and pain of having cancer and going through treatments. As emphasized by Okado et al. (2014) it is possible that the experience of having a life-threatening pediatric condition, such as cancer, may strengthen the link between parent and child functioning because of the increased contact between both. Moreover, they might share experiences that lead to intense emotional reactions, which in turn may increase the sense of solidarity that could increase the cooccurrence of distress within the dyad.

The significant but weaker links between caregivers' emotional distress symptoms and their children's aggression and externalizing problems is consistent with some prior work. For example, Fedele and colleagues (2013), in a study with 52 mothers of children ranged in age from 2 to 17 years who were newly diagnosed with cancer, did not found associations between maternal distress and children externalizing problems. The authors concluded that externalizing problems in children with cancer associated with maternal distress may take longer to develop or may occur more frequently in younger children, as was the case in our study, as well as some others (e.g., Sawyer et al., 1998).

The lack of association between the socioeconomic resources of families and children's narrow-band and broad-band behavior problems was unexpected. Given that this was a sample of families that was likely to be experiencing elevated acute and chronic stress due to the children's severe health problems, it is possible that any effects of living in economically disadvantaged contexts were washed out. In addition, there was relatively low variability in the levels of parents´ education and income in our sample, which may have limited our ability to detect effects. Thus, further investigations will be needed to replicate and confirm the current non-significant results.

Some limitations should be taken into account when considering these interpretations of the findings of our study. First, the data were collected at a single point in time. It is reasonable to consider that the relation between parent and child adjustment may change over the course of a disease like cancer. Longitudinal studies are required to provide a deeper understanding of the changing associations among the variables examined in this type of investigation. Second, the directional nature of the relations between caregiver and child adjustment was not addressed by this investigation. Future research should use longitudinal or experimental designs so that directional relations can be ascertained. Third, in this study only the caregivers gave information regarding their own and their children's emotional symptoms. The use of multiple informants, including the children themselves and their 17 teachers or medical personnel, for instance, may help to minimize rater bias. Further, the majority of caregivers in this study were mothers, such that we could not compare mothers' versus fathers' ratings of children's adjustment. Finally, future research should consider the

effects of additional family variables, such as health status of the siblings, marital conflict, and school factors to better elucidate the breadth of factors that may influence internalizing and externalizing problems, and thereby more clearly identify the specific contributions of caregivers' emotional symptoms and well-being, in children and adolescents living with cancer.

Conclusion

In conclusion, this study revealed results that can be useful to support health professionals in planning intervention strategies created to improve mental health of the children/adolescents with cancer and their families. Intervention programs should aim to promote children's and adolescents' adjustment to cancer and also meet the needs of parents enabling them throughout the course of the disease of their child to keep their mental health and to perform their parental skills in a healthier way for their children and for themselves.

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